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- BARLEY COMPOSITION
- GERMINATION
- MALT QUALITY

Agricultural Research Service
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THE INFLUENCE OF THE WILD OAT HERBICIDE, BARBAN, ON
BARLEY COMPOSITION, GERMINATION, AND MALT QUALITY ^{1/}

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The chemical 4-chloro-2-butynyl N-(3-chlorophenyl) carbamate (barban)^{2/} has shown promise as a wild oat herbicide. Through the courtesy of Spencer Chemical Company and Dr. George Friesen of the University of Manitoba, barley grain from treated and control plots were made available to study the effect of the spray treatment on barley composition and malting quality.

Traill barley grown near Fargo, N. Dak., in 1959 was sprayed with two concentrations of barban at several stages of development of the plants. Parkland barley grown at Winnipeg, Manitoba, Canada, was sprayed with the same concentrations of the chemical at similar stages of development. In both cases, comparable untreated samples were available.

Barley nitrogen, kernel weight, plump barley, and barley color for treated and check samples are given in table 1 with details of rate and times of application. The barleys were lower in nitrogen than typical barleys from the two areas, and the Parkland samples were low in kernel weight for the variety in most years. However, these differences should not invalidate the comparison of treated and control samples. Based on the data given in table 1, the spray treatment had no consistent influence on barley characteristics usually associated with malt quality.

Previous to experimental malting, the barleys were tested for germination percentage. Duplicate 100 kernel samples were placed on moist blotters in stainless steel trays designed for the purpose. The samples were placed in a 16° C. cabinet and readings taken after 24, 48, and 72 hours. The germination percentages, given in table 2, are averages of duplicate readings. Single samples of each barley were steeped to 45 percent moisture, malted for 6 days, and the green malts were kilned. The extent of growth of the plumule or acrospire in relation to the length of the kernel was determined, and malt growth index values were calculated. Recovery of malt from barley was calculated from dry-basis weights of original barley and of cleaned malt. Values for these factors are given in table 2.

^{1/} Crops Research Division, Agricultural Research Service, United States Department of Agriculture, and the Wisconsin Agricultural Experiment Station, cooperating.

^{2/} Barban will be available in 1960 for use under an experimental permit only. It cannot be recommended (as of March 9, 1960) for use on Cereals since inadequate evidence has been developed to prove it will leave no residue or/and tolerances have not been set under Public Law 518.

Although percentage germination at the several times did not differ significantly over the samples, the rate of growth observed was somewhat slower for the treated Traill samples after 72 hours of germination. The slightly lower growth index values for the last three Traill malts also indicates slower growth, but only in the last sample was this sufficient to result in a higher malt recovery than for the other samples. The treated Parkland samples did not show the lower growth rate.

The malts were analyzed for the conventional quality factors, and the data are given in table 3. The small differences in malt composition of Traill samples can be explained by variation in barley nitrogen and kernel weight in practically all cases. Amylase values for the last Parkland sample appear higher than would be expected from the higher barley nitrogen, but are likely not related to treatment.

On the basis of 1 year's test with two barley varieties, spraying barley with barban in early seedling stages had no effect on barley composition or malt quality. Rate of growth during germination and malting may be reduced slightly in some cases.

Table 1.--The influence of the application of barban to barley plants on barley characteristics of two varieties grown at two locations in 1959.

Rate and stage of application of barban	Treatment code	Barley nitrogen	Pct.		Barley kernel weight	Plump barley on 6/64 sieve	Barley color Agtron units
			Mg.	Pct.			
TRAILL--FARGO, NORTH DAKOTA							
Check - no treatment	1-02-check	1.49	29.7	37.3	52		
1 1/2 lb/A. emergence to 1-1/4 leaf stage	1-02-21	1.55	29.1	43.3	53		
1 1/2 lb/A. 1-1/2 to 2-1/4 leaf stages	1-02-22	1.49	29.1	41.0	53		
1 1/2 lb/A. 3-3/4 to 4-1/2 leaf stages	1-02-23	1.50	29.8	38.6	52		
1 lb/A. emergence to 1-1/4 leaf	1-02-31	1.55	30.6	39.3	55		
1 lb/A. 1-1/2 to 2-1/4 leaf	1-02-32	1.46	29.9	39.7	64		
PARKLAND--WINNIPEG, MANITOBA							
Check - no treatment	3-02-check	1.83	25.3	41.7	48		
1 1/2 lb/A. 2 leaf stage	3-02-22	1.65	25.4	55.0	53		
1 1/2 lb/A. 4-1/2 leaf stage	3-02-23	1.74	26.0	42.9	51		
1 lb/A. 2 leaf stage	3-02-32	1.89	27.3	48.1	50		

Table 2.--The influence of the application of barban to barley plants on the germination and growth during malting of two varieties grown at two locations in 1959.

Rate and stage of application of barban	Treatment code	Barley germination			Malt growth index	Recovery of malt from barley
		24 hrs.		72 hrs.		
		Pct.	Pct.			
TRAILL--FARGO, NORTH DAKOTA						
Check - no treatment	1-02-check	76	97	100	85	89.8
1 1/2 lb/A. emergence to 1-1/4 leaf stage	1-02-21	70	95	98	87	89.0
1 1/2 lb/A. 1-1/2 to 2-1/4 leaf stage	1-02-22	65	93	99	86	89.9
1 1/2 lb/A. 3-3/4 to 4-1/2 leaf stage	1-02-23	65	94	99	83	89.3
1 lb/A. emergence to 1-1/4 leaf stage	1-02-31	74	93	99	80	89.8
1 lb/A. 1-1/2 to 2-1/4 leaf stage	1-02-32	77	97	99	79	90.6
PARKLAND--WINNIPEG, MANITOBA						
Check - no treatment	3-02-check	84	97	99	74	89.4
1 1/2 lb/A. 2 leaf stage	2-02-22	76	95	97	76	89.8
1 1/2 lb/A. 4-1/2 leaf stage	3-02-23	80	97	99	71	90.0
1 lb/A. 2 leaf stage	3-02-32	78	97	98	78	89.8

Table 3.--The influence of barban applied as a spray to barley plants on malt quality of two varieties grown at two locations in 1959.

Treatment code	Malt moisture	Malt extract dry	Time of conversion	Wort color Lov 52	Wort nitrogen	Malt nitrogen	Wort nitrogen Malt nitrogen	Dia-static power degrees	Beta-amylase maltose equiv.	Alpha-amylase 200 dext. units	Ratio Beta Amylase
	<u>Pct.</u>	<u>Pct.</u>	<u>Min.</u>		<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>				
TRAILL--FARGO, NORTH DAKOTA											
1-02-check	4.6	78.0	5	1.4	0.620	1.47	42.2	127	383	37.3	10.3
1-02-21	4.6	77.5	5-7	1.5	.634	1.47	43.1	146	457	37.9	12.1
1-02-22	4.6	77.8	5-7	1.5	.600	1.41	42.6	135	417	36.6	11.4
1-02-23	4.6	78.0	5	1.6	.617	1.37	45.0	131	393	38.7	10.2
1-02-31	4.7	78.1	5	1.5	.631	1.50	42.1	142	443	37.4	11.8
1-02-32	4.6	78.6	5-7	1.5	.597	1.39	42.9	134	411	37.3	11.0
PARKLAND--WINNIPEG, MANITOBA											
3-02-check	4.6	75.4	5	1.4	.694	1.73	40.1	149	426	49.1	8.7
3-02-22	4.5	75.7	5	1.4	.667	1.56	42.8	141	400	47.9	8.4
3-02-23	4.6	75.7	5	1.9	.663	1.67	39.7	140	407	44.8	9.1
3-02-32	4.6	75.6	5	1.9	.721	1.82	39.6	174	516	56.0	9.2

